# The MVTec Anomaly Detection Dataset: A Comprehensive Real-World Dataset for Unsupervised Anomaly Detection

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## Abstract

The detection of anomalous structures in natural image data is of utmost importance for numerous tasks in the field of computer vision. The development of methods for unsupervised anomaly detection requires data on which to train and evaluate new approaches and ideas. We introduce the MVTec anomaly detection dataset containing 5354 high-resolution color images of different object and texture categories. It contains normal, i.e., defect-free images intended for training and images with anomalies intended for testing. The anomalies manifest themselves in the form of over 70 different types of defects such as scratches, dents, contaminations, and various structural changes. In addition, we provide pixel-precise ground truth annotations for all anomalies. We conduct a thorough evaluation of current state-of-the-art unsupervised anomaly detection methods based on deep architectures such as convolutional autoencoders, generative adversarial networks, and feature descriptors using pretrained convolutional neural networks, as well as classical computer vision methods. We highlight the advantages and disadvantages of multiple performance metrics as well as threshold estimation techniques. This benchmark indicates that methods that leverage descriptors of pretrained networks outperform all other approaches and deep-learning-based generative models show considerable room for improvement.